RECOMMENDATIONS

The staff at the CDRS encourages additional naturalist guides to become involved in reporting information about flamingos at any location in the archipelago, in order to obtain as much information as possible.

Because reports of visits in which no flamingos are sighted (negative data) are just as important as the ones from visits in which the birds are observed (positive data), the CDRS staff would encourage the guides to submit both kinds of data to this on-going monitoring of flamingos.

Because little is known about the reproductive behavior of flamingos, information on courtship behavior, nests, chicks, and juveniles is particularly appreciated.

The GNPS should reduce the number of groups per day visiting Punta Cormorant so that it coincides with the numbers established in the study of carrying capacity.

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Christine Breuker, Western Reserve Academy, Hudson, OH 44236 USA (e-mail: cbreuker@aol.com). Hernán Vargas, Charles Darwin Research Station, Puerto Ayora, Galápagos, Ecuador (e-mail: hernanv@fcdarwin.org.ec).

INSIDIOUS INVADERS

By: J. P. Lundh

Those involved in the work of conservation in the Galápagos Islands have given first priority to the control of introduced mammals. This is amply justified by the enormous destruction these animals have caused to the flora and fauna of the islands where they have been introduced. But there are other invaders that are far less obvious due to their size, which usually also makes us unaware of their presence until they have become more or less established and thus nearly impossible to eradicate.

Dr. Chantal M. Blanton, Director of the Charles Darwin Research Station (CDRS) from May 1992 to September 1996, has expressed concern about the introduction of these small animals, recommending stricter control. This has become most urgent, considering the greatly increased traffic between the islands and the mainland in the last two or three decades. The likelihood of introducing such animals has increased enormously compared to previous years. This is not to say that the problem is recent or that its importance has not been realized before.

Fortunately, it is far from easy for accidentally introduced living organisms to become established. A cargo with half a dozen geckos scattered throughout it is not necessarily an opportunity for these to become established on an island. There is the possibility of the animals not going ashore with the cargo or being eaten by a predator upon arrival. A gravid female must arrive, or a female

and a male must meet and breed. For many such small animals, the Galápagos lowlands may become the ultimate barrier, given how inhospitable the dry region is for most of the year. Had it been easier to become established, Galápagos could have had a more varied insect fauna and a greater number of gecko species – if there had been enough food for all. We must remember that ships have brought cargo to Galápagos since 1832 – split bamboo, lumber, cases with various contents, and other potential hiding places.

But such introductions are not impossible. Wheeler (1919) reports eighteen ant species collected in the Galápagos. Of these, six are mentioned as "relatively recent introductions." Hebard (1920) reports nine cockroach species for the Galápagos, only one of them endemic *(Anisopygia snodgrassii)*. Hebard believes the eight non-endemic species to have been introduced from the mainland in cargo brought to the Islands. One species, the German cockroach *(Blatella germanica)*, he reports only from Española Island. This species became very common in the inhabited parts of Santa Cruz Island during the 1940s, and the settlers believed it had come from Panama via the military base on Baltra Island.

The little red fire ant *(Wasmannia auropunctata)*, which is now so abundant on Santa Cruz, was introduced from there to some of the other islands. It was first discovered on Santa Cruz about 1934, in some shrubbery near the Puerto Ayora landing. In 1935, there was an area at the beginning of the inland trail where this ant had become established in large numbers. It later spread with the help of people, especially during El Niño years, when the trail became overgrown, making it possible for the ants to be brushed off in large numbers on people's clothes and on the loads carried by donkeys. This was because the ants climb onto the leaves and branches to get away from the rain-soaked ground.

It is possible that *Wasmannia* was brought to Santa Cruz from Cocos Island. Several scientific expeditions visited the Galápagos in the early 1930s that stopped at Puerto Ayora after having visited Cocos Island on their way to Galápagos. The ant is extremely numerous on Cocos and has been so for many years. Snodgrass and Heller (1902) found it abundant on Cocos in 1899.

Before the turn of the century, Dr. George Baur collected four geckos on San Cristóbal Island which belonged to a then-unknown species. It was described by Garman in 1892 and given the name of *Gonatodes collaris* (Van Denburgh, 1912). Later expeditions were unable to find this species. The California Academy of Sciences Expedition of 1905-06 made extensive collections of geckos from San Cristóbal – 148 specimens of *Phyllodactylus leei*, an endemic species, and 21 of *P. tuberculosus*, a common mainland species that had become established on the island. No *Gonatodes* was found (Van Denburgh, 1912).

It was discovered much later that *G. collaris* is a mainland species. It is, of course, possible that the Baur specimens had been collected in Guayaquil and became mixed up with his collections from San Cristóbal. However, there is another possibility – Baur had collectecd a newly introduced gecko, either catching the lot or taking so many that they could not become established.

The next collection of *Gonatodes* that I know of consisted consisted of three specimens I caught in the general area of the landing at Puerto Baquerizo Moreno, San Cristóbal, in 1961 or 1962. These I gave to Dr. André Brosset, then Director of the CDRS. Unfortunately, Dr. Brosset left the Islands before he received information about their identity. Later, I saw several geckos that appeared to belong to the same species, or a closely related one, in the same area. Dr. Marinus S. Hoogmoed believes my specimens could be *Gonatodes caudiscutatus* (Hoogmoed, pers. comm., 1991). This particular species has been reported from both the towns of Puerto Baquerizo Moreno and El Progreso.

Another gecko *(Lepidodactylus lugubris)*, of pantropical distribution, has been reported from Santa Cruz (Hoogmoed, 1989). However, Dr. Hoogmoed did not meet with this species while he was doing a preliminary study of another gecko *(Phyllodactylus reissi)*, also a recent introduction, which had been observed for the first time in 1975, near the Puerto Ayora landing. This last species gives good reason to fear for the survival of the gecko native to the island *(P. galapagensis)*, since the latter disappears from areas invaded by its larger relative, the introduced *P. reissi* (Hoogmoed, 1989).

There is still much to learn about these small invaders and how they affect the island species with which they must compete. Unfortunately, their small size is their greatest advantage. It makes it easy for them to hide in cargo from the mainland and to remain unnoticed for a long time. Once successfully established, they may turn out to be impossible to eradicate. The little red fire ant is an example familiar to every Galápagos resident and can serve to raise local awareness of the insidious invaders.

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J. P. Lundh, Oslo, Norway.